

Respirator Selection & APF

Chris Caron

American Safety &
Supply, Inc.



Why So Important???

In 2017 The International Agency for research on Cancer (IARC) – Part of the World Health Organization (WHO) reclassified welding fumes and UV radiation as a Known Group 1 carcinogen. As a Class I carcinogen, welding fumes are now in the same category as smoking for a cancer risk. In addition the IARC states that up to 1-percent of the world's workforce may be exposed to welding fumes while on the job.

Respirator Selection

- Measure Employee Exposure
 - OSHA's Air Contamination Standard states that..." *A competent industrial hygienist or other technically qualified person*"...shall conduct exposure monitoring.

Respirator Selection

- Implement Control Measures

“The use of respirators is appropriate only after you have determined and implemented feasible administrative and/or engineering controls.”

- Enclose or confine a process
- Employ improved local ventilation
- Substitute for a less toxic chemical/Process

Respirator Selection

- Review APFs and MUCs to Ensure Proper Selection
 - APF = Assigned Protection Factor:
 - The level of Protection a Class of Respirator is expected to provide
 - MUC = Maximum Use Concentration
 - **Maximum concentration of atmospheric pollutants** that an employee will be protected from when using a specific class of respirator.

APF Notes

- The assigned protection factors are only effective when the employer implements a continuing, effective respirator program (1910.134) including training, fit testing maintenance and use requirements.
- APF May also include Filtering Face Pieces.
- These APFs do not apply to respirators used solely for escape.

Assigned Protection Factors

| <u>Type of Respirator</u> | <u>Half Mask</u> | <u>Full Face</u> |
|---|------------------|------------------|
| Air Purifying Respirator | 10 | 50 |
| Filtering Face-Piece | 10 | NA |
| Hood or Loose-Fitting PAPR | NA | 25 |
| Tight-Fitting PAPR | 50 | 1,000 |
| Supplied-Air Respirator – CF | 50 | 1,000 |
| Supplied-Air Respirator – PD | 50 | 1,000 |
| Self-Contained Breathing Apparatus (SCBA) | NA | 10,000 |

Respirator Selection

Example – A Full Face APR has an APF of 50.

The chemical **Dimethylthingamabob** has a PEL (Permissible Exposure Limit) of 10 ppm.

Multiplying the APF(50) by the PEL(10) gives us an MUC of 500 ppm. In our workplace example, the exposure level (MCU) of the **Dimethylthingamabob** is expected to reach 30ppm. In this example, the full face APR will offer more than sufficient protection.

Respiratory Protection



Powered-Air-Purifying-Respirator – PAPR - Welding

Studies show that full-time welders are at increased risk of bronchitis, airway irritation, lung function changes, pulmonary infections (pneumonia), and lung cancer.



Respiratory Hazards - Fumes

- **Welding Fumes:**

Welding fume is a complex mixture of very small particles of metal oxides. The specific components depend on the composition of the welding electrode (stick, wire or filler rod), base metal, surface coatings and the type of shielding gas or flux.



Respiratory hazards – Gas and Vapor



- **Gases and Vapors:**
When electrode coatings, fluxes, shielding gases and surface coatings are burned or exposed to ultraviolet arc rays, they can generate potentially harmful gases such as carbon monoxide, ozone, nitrogen oxides, gaseous fluoride and phosgene.

PAPR – Tight-Fitting

- Powered respirators, or PAPRs, use a battery-powered blower to pull air through filters and/or cartridges providing the user with “Purified” or “Filtered Air.”
- Because filtered air is constantly flowing into the headpiece under pressure, leakage of contaminants into the helmet is greatly reduced, increasing the level of protection for these respirators.

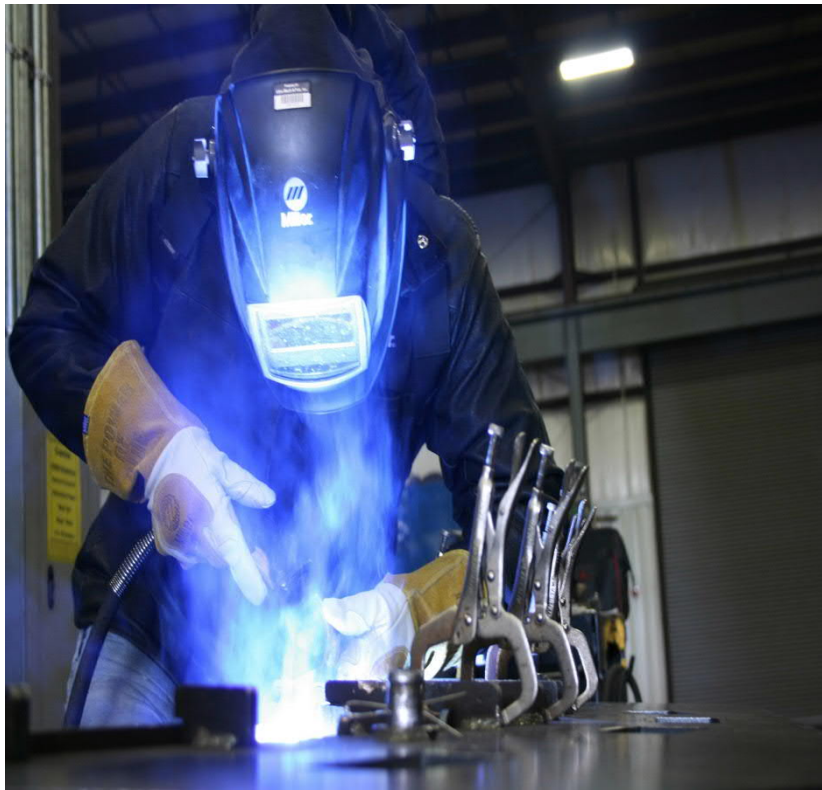


More PAPR Applications

Some PAPRs will only accept a P-100 other will accept Organic Vapor cartridges to protect from those hazards



Other Safety Concerns for Welders



- Harmful Light
- High Noise Levels
- Combustion/Ignition
- Dehydration/Heat Stress
- Others

Respirator Selection in Review

1. Identify the hazard including exposure.
2. Attempt to control or eliminate the hazard.
3. Select a respirator with an appropriate APF.
4. Continually review your program to ensure effectiveness.